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## Specification

## 1. Name of the invention

Washing Assistant

2. Scope of invention claimed. claims

A washing assistant every particle of which is coated with a water-soluble coating agent consisting of a mixture of polyvinyl acetal di-alkyl amino acetate and one type or two or more types of organic acids which are solid and soluble to organic solvent with the gram equivalent ratio of the latter to the former being 0.4 to 0.9, which is further mixed with a film forming substance which is solid at room temperature and water-soluble of about 0.3 to 2 times the weight of the said mixture.

## 3. Detailed description of the invention

This invention relates to a washing assistant. Particularly, it relates to washing assistant whose wash-promoting substance is coated with a coating agent, of which solubility varies with the pH so that it is practicably insoluble in an alkaline washing liquid while it is soluble in a neutral rinsing liquid.

By blending beforehand the washing assistant of this invention into detergent composition, or by charging into washing water the assistant together with detergent at the start point of washing, this invention allows to protect effective substances from dissolving into the washing liquid during the washing phase, and then once rinse is started, allows to elute them immediately into rinsing liquid, thus providing the effects of the assistant effectually, and further the invention can save the labor of adding later the washing assistant which, traditionally, had to be added separately in the rinse process because, in this invention, it is blended or added in the first place at the beginning.

In this context, the inventors of this invention previously presented another invention of Pat. Appl. (S) 48-6190. More precisely, we presented a washing assistant every particle of which is coated with a water-soluble coating agent consisting of a mixture of polyvinyl acetal di-alkyl amino acetate and one type or two or more types of organic acids which are solid and soluble to organic solvent with the gram equivalent ratio of the latter to the former being 0.4 to 0.9.

However, after accumulated study of ours, it was found that such washing assistant has a defect that it is more soluble in winter time and less soluble in summer time in practice due to the temperature dependency of the coating agent's solubility.

This invention intends to provide a washing assistant free of such defect.

The said purpose of this invention can be realized by providing a washing assistant every particle

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of which is coated with a water-soluble coating agent consisting of a mixture of polyvinyl acetal di-alkyl amino acetate and one type or two or more types of organic acids which are solid and soluble to organic solvent with the gram equivalent ratio of the latter to the former being 0.4 to 0.9, which is further mixed with a film forming substance which is solid at room temperature and water-soluble of about 0.3 to 2 times the weight of the said mixture.

Polyvinyl acetal di-alkyl amino acetate used in this invention, particularly, polyvinyl acetal di-ethyl amino acetate (hereafter referred to as ABA), is obtained through a process in which hydrolysate of polyvinyl acetate is partly esterified with monochloro acetic acid, then acetalized with fatty aldehyde having two to four carbon numbers, then aminated with di-lower alkyl amine (see the official Gazette of Sankyo Co. Ltd. Pat. Gaz. (S) 40-378). This substance has a property to dissolve into water in the pH 5.8 or lower acid area, and is used as a coating agent to prevent chemicals from moisture absorption or deterioration.

We have organic acids including malic acid, succinic acid, tartaric acid, citric acid, fumaric acid, maleic acid, malonic acid, glutar acid, adipic acid, phthalic acid, para-toluene sulfonic acid, naphthalene sulfonic acid, sulfon amine acid, para-xylene sulfonic acid, which are solid at room temperature, and soluble to organic solvent. Among them, effective products are dibasic fatty acid such as fumaric acid, malic acid, maleic acid, tartaric acid, and adipic acid, iso-phthalic acid and para-toluene-sulfonic acid which are in a mixed condition.

They can be some of film forming substances which are solid at room temperature, and soluble to water, or soluble to methanol and other alcohols, acetone, chloroform, chloroethene, methylene chloride, ethylene chloride, ethyl ceto-solve, and other polar organic solvent, and we can name polyvinyl alcohol, polyvinyl pyrrolidone, hydroxy propyl-methyl cellulose and hydroxy propyl cellulose for suitable example.

To manufacture coating agent of this invention, take the basic molecular weight of ABA (657) for the base, for example, then mix ABA and 0.4 to 0.9 gram equivalent ratio of the said organic acid in an organic solvent, and further, add and mix film forming substances which are solid at room temperature and soluble to water, of which weight being approximately 0.3 to 2 times the weight of the above mixture, thus we can easily produce the article.

To coat a washing assistant, this organic solvent solution can be used.

Suitable organic solvent would include methanol, ethanol, iso-propanol and other alcohols, acetone, chloroform, chloroethene, methylene chloride, ethylene chloride, ethyl ceto-solve and other polar solvent with low-boiling point, or a mixed solvent of the above, or water-containing solvents.

If the gram equivalent ratio of the said organic acid against ABA is greater than 0.9, then the acid will be too soluble to both of washing liquid and rinsing liquid, and if the ratio is smaller than 0.4, then the acid will not be solved in normal rinsing process, thus either of the above is not adequate for a washing assistant.

The said film forming substance is used by the amount of about 0.5 to 2 times that of the mixture of ABA and organic acid, preferably by 0.5 to 1.5. If this rate is smaller than about 0.3, then the solubility of the coated article will be lower with temperature rise, and no improvement can be attained, while if it is greater than 2 time, then the solubility of the coated article will be higher with temperature rise, and can not achieve the purpose.

Washing assistant coated with the coating agent of this invention would include a soft finishing agent, blue tinting agent, fluorescent whitening agent, defoaming agent, perfume, glue, bleaching agent (oxidizing or reducing) and enzyme, and these substances are coated after pelletization individually or in mixture.

Next, the merits of the detergent composition in which washing assistant of this invention is applied, or of the washing procedure of this invention are listed below.

(1) If the washing assistant is a softening agent:

In the past, available softening agents were not found which are compatible to heavy anionic detergents. This was because softening agents are cationic and they are not compatible to anionic detergents.

However, if a washing assistant of this invention is used, cationic softening agents will be eluted into the rinsing liquid in which most of anionic detergents have gone away, thus it can provide sufficient softening effects to the full without decreasing the washing ability by the produced complex with anionic detergent, and without making spot contamination.

(2) If the washing assistant is a defoaming agent:

Detergents should give out, in general, sufficient foams during the washing phase while it should quickly eliminate foams during the rinsing phase. If any defoaming agent is blended with the detergent, foaming will be restrained during the washing phase, and therefore the addition level of foaming agent needs to be adjusted. If an assistant of this invention is used, it will be eluted during the rinsing phase, and as a result, the amount of the defoaming agent can be reduced while sufficient defoaming effect can be provided.

(3) If the washing assistant is a fluorescent dyestuff:

Some fluorescent dyestuff is remarkably improves its dyeing ability if it is put in neutral or acidic environment rather than in alkaline environment. Such dyestuff is not expected to provide

sufficient effects if it is blended directly with detergent because the washing liquid is alkaline. The stuff will be discharged out together with the drain from the system. However, if an assistant of this invention is used, it will be eluted in rinse water which is neutral, thus it will provide sufficient effect with small amount of use.

The following describes an example of embodiment.

#### Embodiment

Excipient and disintegrating agent of 99.36 weight portion was added to water-soluble pigment, blue No.1, of 0.64 weight portion to make granules, then the granules were screened with a sieve to obtain selected granules of grain size of 24 to 80 mesh. Thus prepared granules were loaded in a tablet machine to produce tablets with the diameter of 9.1mm, the thickness of 4.5mm and the weight of 259.7mg.

These tablets were coated with four types of coating agents, of which compositions are shown below, so that the coating agents will be 20 weight percent through conversion into solid equivalent.

#### Composition (1):

ABA of 3.33 weight portion, para-toluene sulfonic acid of 0.77 weight portion, hydroxy propyl methyl cellulose (mean molecule weight of 11,000) of 3.33 weight portion, ethanol of 46 weight portion and methylene chloride of 46.57 weight portion.

#### Composition (2):

ABA of 3.33 weight portion, para-toluene sulfonic acid of 0.77 weight portion, polyvinyl alcohol (mean molecule weight of 22,000) of 3.33 weight portion, methanol of 64 weight portion and water of 28.57 weight portion.

#### Composition (3):

ABA of 3.33 weight portion, para-toluene sulfonic acid of 0.77 weight portion, polyvinyl pyrrolidone (mean molecule weight of 40,000) of 1.11 weight portion, polyvinyl alcohol (mean molecule weight of 22,000) of 2.22 weight portion, methanol of 54 weight portion and water of 38.58 weight portion.

#### Composition (4) (control for comparison):

ABA of 10 weight portion, para-toluene sulfonic acid of 1.31 weight portion, and ethanol of 88.69 weight portion.

Coated tablets created through the above prescriptions were charged into a washing machine together with detergent consisting of normal-chain alkyl-benzene sodium sulfonate of 20 weight portion, sodium tri-polyphosphate of 25 weight portion, mirabilite of 45 weight portion and water of 15 weight portion. In this liquid, clothes (cotton towel and baby cotton towel) were washed for five minutes, then rinse was conducted. Here, the time period was measured and recorded from the time when the rinse was started to the time when the coating agent started to dissolve, allowing the blue pigment core to flow out. Test was conducted each at water temperature of 10°C, 20°C and 30°C

Results are shown in Fig. 1. As shown in the figure, Compositions (1), (2) and (3), in which water-soluble film forming substance is added, is free from temperature dependency. On the other hand, the control for comparison which does not contain water-soluble film forming substance, shows faster dissolution with lower temperature, and slower dissolution with higher temperature.

#### 4. Brief description of drawing

Fig. 1 is a graph showing that the solubility of the coating agents used in this invention are independent from temperature.

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#### 5. List of attached documents

- (1) One copy of specification
- (2) Once copy of drawing
- (3) Two copies of power of attorney
- (4) One copy of application duplicate
- (5) One copy of request for examination

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Fig. 1

Time to the start of dissolution

Composition (4)

Composition (2)

Composition (1)

Composition (3)

Temperature (°C)